AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Please amend claims 1, 10, 16, 18, 20, 23, 26, 31, 39, 51, 60, 66, and 70, and cancel claims 3 – 9, 15, 17, 19, 21 – 22, 24 – 25, 27, 29, 32 – 33, 35, 40 – 43, 45 – 46, 48 – 50, 52 – 59, and 63 – 65, inclusive, as follows:

1 (Currently Amended). An apparatus, comprising:

a reference resonator adapted to provide a first signal having a resonant frequency;

an amplifier coupled to the reference resonator; and

a frequency controller coupled to the reference resonator, the frequency controller adapted to select a resonant frequency having a first frequency of a plurality of ~~frequencies.~~ frequencies, the frequency controller comprising:

a coefficient register adapted to store a first plurality of coefficients; and

a first array having a plurality of switchable capacitive modules coupled to the coefficient register and to the reference resonator.

2 (Original). The apparatus of claim 1, further comprising:

a frequency divider coupled to the resonator, the frequency divider adapted to divide the first signal having the first frequency into a plurality of second signals having a corresponding plurality of frequencies, the plurality of frequencies substantially equal to or lower than the first frequency.

3 – 9 (Cancelled).

10 (Currently Amended). The apparatus of claim 2, wherein the frequency divider ~~further~~ comprises a ~~square-wave generator, the~~ square-wave generator adapted to convert the first signal into a substantially square-wave signal having a substantially equal high and low duty cycle.

11 (Original). The apparatus of claim 2, further comprising:

a frequency selector coupled to the frequency divider, the frequency selector adapted to provide an output signal from the plurality of second signals.

12 (Original). The apparatus of claim 11, wherein the frequency selector comprises a multiplexer and a glitch-suppressor.

13 (Original). The apparatus of claim 11, further comprising:

a mode selector coupled to the frequency selector, the mode selector adapted to provide a plurality of operating modes, the plurality of operating modes selected from a group comprising a clock mode, a timing and frequency reference mode, a power conservation mode, and a pulse mode.

14 (Original). The apparatus of claim 13, further comprising:

a synchronization circuit coupled to the mode selector; and

a controlled oscillator coupled to the synchronization circuit and adapted to provide a third signal;

wherein in the timing and reference mode, the mode selector is further adapted to couple the output signal to the synchronization circuit to control timing and frequency of the third signal.

15 (Cancelled).

16 (Currently Amended). The apparatus of claim 1, wherein the amplifier further comprises a negative transconductance ~~amplifier.~~ amplifier and wherein the frequency controller is further adapted to modify a current through the negative transconductance amplifier in response to temperature.

17 (Cancelled).

18 (Currently Amended). The apparatus of claim 16, ~~claim 17,~~ wherein the frequency controller further comprises a current source responsive to ~~temperature.~~ temperature and wherein the current source has one or more configurations selected from a plurality of configurations, the plurality of configurations comprising CTAT, PTAT, and $PTAT^2$ configurations.

19 (Cancelled).

20 (Currently Amended). The apparatus of claim 16, wherein the frequency controller is further adapted to modify a current through the negative transconductance amplifier or modify a transconductance of the negative transconductance amplifier to select the resonant frequency to select the resonant frequency or in response to a voltage.

21 - 22 (Cancelled).

23 (Currently Amended). The apparatus of claim 1, wherein the frequency controller further comprises a voltage isolator coupled to the resonator and adapted to substantially isolate the resonator from a voltage ~~variation.~~ variation, wherein the voltage isolator comprises a current mirror having a cascode configuration.

24 – 25 (Cancelled).

26 (Currently Amended). The apparatus of claim 1, wherein the frequency controller is further adapted to modify a capacitance or an inductance of the resonator in response to fabrication process variation, temperature variation, or voltage variation.

27 (Cancelled).

28 (Original). The apparatus of claim 1, wherein each switchable capacitive module comprises a ~~the frequency controller further comprises:~~

~~a coefficient register adapted to store a first plurality of coefficients; and~~

~~a first array having a plurality of switchable capacitive modules coupled to the coefficient register and to the resonator, each switchable capacitive module having a~~ fixed capacitance and a variable capacitance, and wherein each switchable capacitive module is responsive ~~responsive~~ to a corresponding coefficient of the first plurality of coefficients to switch between the fixed capacitance and the variable capacitance and to switch each variable capacitance to a control voltage.

29 (Cancelled).

30 (Original). The apparatus of claim 28, wherein the frequency controller further comprises:

a second array having a plurality of switchable resistive modules coupled to the coefficient register and further having a capacitive module, the capacitive module and the plurality of switchable resistive modules further coupled to a node to provide the control voltage, each switchable resistive module responsive to a corresponding coefficient of a second plurality of coefficients stored in the coefficient register to switch the switchable resistive module to the control voltage node; and

a temperature-dependent current source coupled through a current mirror to the second array.

31 (Currently Amended). The apparatus of claim 1, wherein the frequency controller further comprises:

a process variation compensator, the process variation compensator coupled to the resonator and adapted to modify the resonant frequency in response to fabrication process ~~variation.~~ variation, and wherein the process variation compensator further comprises:

a coefficient register adapted to store a plurality of coefficients; and

an array having a plurality of switchable capacitive modules coupled to the coefficient register and to the resonator, each switchable capacitive module having a first fixed capacitance and a second fixed capacitance, each switchable capacitive module responsive to a corresponding coefficient of the plurality of coefficients to switch between the first fixed capacitance and the second fixed capacitance.

32 - 33 (Cancelled).

34 (Original). The apparatus of claim 31, wherein the process variation compensator further comprises:

a coefficient register adapted to store a plurality of coefficients; and

an array having a plurality of switchable variable capacitive modules coupled to the coefficient register and to the resonator, each switchable variable capacitive module responsive to a corresponding coefficient of the plurality of coefficients to switch between a first voltage and a second voltage.

35 (Cancelled).

36 (Original). The apparatus of claim 31, wherein the process variation compensator further comprises:

a coefficient register adapted to store a plurality of coefficients; and

an array having a plurality of switchable capacitive modules coupled to the coefficient register and to the resonator, each switchable capacitive module having a fixed capacitance and a fuse, each switchable capacitive module responsive to a corresponding coefficient of the plurality of coefficients to open circuit the fuse.

37 (Original). The apparatus of claim 1, further comprising:

a frequency calibration module coupled to the frequency controller, the frequency calibration module adapted to modify the resonant frequency in response to a reference signal.

38 (Original). The apparatus of claim 37, wherein the frequency calibration module comprises:

a frequency divider coupled to the frequency controller, the frequency divider adapted to convert an output signal derived from the first signal having the first frequency to a lower frequency to provide a divided signal;

a frequency detector coupled to the frequency divider, the frequency detector adapted to compare the reference signal to the divided signal and provide one or more up signals or down signals; and

a pulse counter coupled to the frequency detector, the pulse counter adapted to determine a difference between the one or more up signals or down signals as an indicator of a difference between the output signal and the reference signal.

39 (Currently Amended). The apparatus of claim 1, wherein the resonator comprises an inductor (L) and a capacitor (C) coupled to form an LC-tank, the LC-tank having a selected configuration of a plurality of LC-tank ~~configurations.~~configurations; or wherein the resonator is selected from a group comprising: a ceramic resonator, a mechanical resonator, a microelectromechanical resonator, and a film bulk acoustic resonator

40 – 43 (Cancelled).

44 (Original). The apparatus of claim 1, wherein the frequency controller further comprises:

a temperature compensator coupled to the amplifier;

a voltage isolator coupled to the resonator; and

a process variation compensator coupled to the resonator.

45 - 46 (Cancelled).

47 (Original). The apparatus of claim 1, further comprising:

a second oscillator providing a second oscillator output signal; and

a mode selector coupled to the frequency controller and to the second oscillator, the mode selector adapted to switch to the second oscillator output signal to provide a power conservation ~~mode.~~ <u>mode or to periodically start and stop the resonator to provide a pulsed output signal.</u>

48 – 50 (Cancelled).

51 (Currently Amended). An apparatus, comprising:

a <u>reference</u> resonator adapted to provide a first signal having a resonant frequency;

an amplifier coupled to the <u>reference</u> resonator;

a temperature compensator coupled to the amplifier and to the <u>reference</u> resonator, the temperature compensator adapted to modify the resonant frequency <u>of the reference resonator</u> in response to temperature;

a process variation compensator coupled to the <u>reference</u> resonator, the process variation compensator adapted to modify the resonant frequency <u>of the reference resonator</u> in response to fabrication process variation;

a frequency divider coupled to the <u>reference</u> resonator, the frequency divider adapted to divide the first signal having the resonant frequency into a plurality of second signals having a corresponding plurality of frequencies, the plurality of frequencies substantially equal to or lower than the resonant frequency; and

a frequency selector coupled to the frequency divider, the frequency selector adapted to provide an output signal from the plurality of second signals.

52 – 59 (Cancelled).

60 (Currently Amended). The apparatus of claim 51, wherein the temperature compensator further comprises:

a coefficient register adapted to store a first plurality of coefficients and a second plurality of coefficients;

a first array having a plurality of binary-weighted switchable capacitance branches coupled to the coefficient register and to the resonator, each switchable capacitance branch having a fixed capacitance and a variable capacitance and responsive to a corresponding coefficient of the first plurality of coefficients to switch between the fixed capacitance and the variable capacitance and to switch the variable capacitance to a control voltage node;

a second array coupled to the control voltage node, the second array having a plurality of switchable resistances coupled to the coefficient register and further having a fixed capacitance, each switchable resistive module responsive to a corresponding coefficient of the second plurality of coefficients to switch the switchable resistive module to the control voltage node; and ~~node;~~

a temperature-dependent current source coupled through a current mirror to the second array.

61 (Original). The apparatus of claim 51, wherein the process variation compensator further comprises:

a coefficient register adapted to store a plurality of coefficients;

an array having a plurality of binary-weighted, switchable capacitive modules coupled to the coefficient register and to the resonator, each switchable capacitive module having a first fixed capacitance and a second fixed capacitance, each switchable capacitive module responsive to a corresponding coefficient of the plurality of coefficients to switch between the first fixed capacitance and the second fixed capacitance; and

a frequency calibration module adapted to generate the plurality of coefficients in response to a reference signal.

62 (Original). The apparatus of claim 51, wherein the process variation compensator further comprises:

a coefficient register adapted to store a plurality of coefficients;

an array having a plurality of binary-weighted, switchable variable capacitive modules coupled to the coefficient register and to the resonator, each switchable variable capacitive module responsive to a corresponding coefficient of the plurality of coefficients to switch between a first voltage and a second voltage; and

a frequency calibration module adapted to generate the plurality of coefficients in response to a reference signal.

63 – 65 (Cancelled).

66 (Currently Amended). A method of generating a reference signal, the method comprising:

<u>using a free-running, reference oscillator, g</u>enerating a resonant signal having a resonant frequency;

adjusting the resonant frequency<u> of the reference oscillator</u> in response to temperature;

adjusting the resonant frequency<u> of the reference oscillator</u> in response to fabrication process variation;

<u>dividing </u>~~divide~~ the resonant signal having the resonant frequency into a plurality of second signals having a corresponding plurality of frequencies, the plurality of frequencies substantially equal to or lower than the resonant frequency; and

selecting an output signal from the plurality of second signals.

67 (Original). The method of claim 66, wherein the resonant signal is a differential, substantially sinusoidal signal, and wherein the method further comprises:

converting the differential, substantially sinusoidal signal to a single-ended, substantially square wave signal having a substantially equal high and low duty cycle.

68 (Original). The method of claim 66, further comprising:

selecting an operating mode from a plurality of operating modes, the plurality of operating modes selected from a group comprising a clock mode, a timing and frequency reference mode, a power conservation mode, and a pulse mode.

69 (Original). The method of claim 66, further comprising:

synchronizing a third signal in response to the output signal.

70 (Currently Amended). An apparatus for generating a clock signal, the apparatus comprising:

a reference LC ~~an LC~~ resonator adapted to provide a differential, substantially sinusoidal first signal having a resonant ~~frequency;~~ frequency, the reference LC resonator comprising an inductor and a capacitor;

a negative transconductance amplifier coupled to the reference LC resonator;

a temperature compensator coupled to the negative transconductance amplifier and to the reference LC resonator, the temperature compensator adapted to modify a current in the negative transconductance amplifier in response to temperature and further to modify a capacitance of the reference LC resonator in response to temperature;

a process variation compensator coupled to the reference LC resonator, the process variation compensator adapted to modify the capacitance of the LC resonator for calibration over ~~in response to~~ fabrication process variation;

a frequency divider coupled to the reference LC resonator, the frequency divider adapted to convert and divide the first signal having the resonant frequency into a plurality of differential or single-ended, substantially square-wave second signals having a corresponding plurality of frequencies, the plurality of frequencies substantially equal to or lower than the resonant frequency, and each second signal having a substantially equal high and low duty cycle; and

a frequency selector coupled to the frequency divider, the frequency selector adapted to provide an output signal from the plurality of second signals.